REMARKS

General:

Claims 1-12, 14-25, 27, and 28 are pending in the application. Claims 1-12, 14-25, 27, and 28 stand rejected. Claim 5 is rewritten in independent form. Claim 9 is canceled. Claims 1-8, 10-12, 14-25, 27, and 28 are pending after this amendment.

It is submitted that rewriting claim 5 in independent form places the application in better form for consideration on appeal, by allowing the patentability of claim 5 to be considered independently of the patentability of claim 1, and is proper under 37 CFR § 116.

No new matter has been added by this amendment.

35 U.S.C. § 103 rejections:

Claims 1-2, 7-12, 14-15, 20-25, and 27-28 are rejected as obvious over U.S. Patent No. 5,547,546 (Prough et al.) Prough shows a chip bin 10 in which chips are added through an air lock 10 at the top and removed through a chip meter 12 at the bottom. The chip bin 10 is filled with "a column of comminuted cellulose material," col. 3, lines 31-32, to a certain level. The level must be within the height range covered by the level detector 26, see for example col. 5, lines 31-35 and col. 6, lines 61-65. The level must also be at least 5 feet above the bottom of the temperature sensor 41, see col. 6, lines 54-57. The chip bin 10 is provided with "a conventional header" 22 for steam generated from black liquor in flash tank 16. The steam header 22 is below the level detector 26, and below the temperature sensor 41. The steam flow rate is regulated so that the steam condenses about 5 feet below the surface of the column of chips, see col. 6, lines 53-54. "Steam is also added through the conventional supporting arms and vibrating cones via conduit 28" at the bottom of the chip bin. Col. 5, lines 5-6.

Claims 3 and 16 are rejected as obvious over Prough in view of U.S. Patent No. 3,661,328 (Leask), which shows a cyclone separator discharging into a storage bin for chips.

Claims 4-6 and 17-19 are rejected as obvious over Prough in view of U.S. Patent No. 5,454,490 (Johanson) which shows conical baffles in the part of a chip bin below the level of the chips, to reduce the pressure exerted at the bottom of the bin by the weight of chips.

Claims 1-3, 14-16, and 27

With respect to claims 1-2, 9-10, 14-15, 22-23, and 27-28, the examiner cites the abstract and three paragraphs of description of Prough, without identifying specific passages. The relevant passages appear to be the following:

> The temperature probe used in the chip bin has a temperature sensing portion with a length of about ten to twenty feet instead of the conventional five foot length, and extends across the level of the chips to a position about five feet below the level of chips.... The chip bin typically ... a temperature probe. The temperature probe ... is rigidly suspended approximately along the centerline of the chip bin. Conventionally, the temperature is only sensed and averaged along a five-foot length at the end of the probe. The remainder of the probe length is for wiring and support. The location of this sensing section varies from bin to bin.... What is different, according to the present invention ... are the details of the temperature probe 25, and the fact that the level detector 26 is used ... to control (along with temperature, as is conventional) supply of steam to the chip bin 10.... The temperature probe 25 according to the present invention is different from conventional temperature probes in that instead of the temperature sensing portion 41 thereof being only about five feet long, it is at least 10 feet long, and preferably about ten to twenty (e.g., ten to fifteen) feet long. As is conventional, the probe 25 is mounted at the top of chip bin 10 and extends downwardly into the chip bin 10. The longer sensing area permits more accurate measurement of the average chip column temperature as the level varies. Conventional chip levels may vary by ten to fifteen feet. Ideally, it is desired that the steam condense about five feet below the surface of the chip column, thus the sensing area 41 of the probe 25 (the bottom-most portion 42 thereof) need only be long enough to sense to about five feet below the level (top) of the chips in the chip column. Since the probe 25 goes across the level of the chip column sensing area, it should be as long as the typical level variation of the chips, that is about ten to fifteen feet.

From this, it appears that in Prough's device:

1. The steam rises from below and condenses at a point "five feet below the surface of the chip column." The sensing area of the probe must "be long enough to sense to about five feet below the level (top) of the chips in the chip column."
2. The "chip levels may vary by ten to fifteen feet."
3. The probe should be as long as the typical level variation of the chips, that is about ten to fifteen feet.

4. The system is intended to accommodate varying chip levels within the range mentioned without loss of function.

5. This describes a structure in which the sensing area of the probe extends from five feet below the lowest chip level to five feet below the highest chip level, so that the probe can always measure the temperature at the key level, five feet below the current chip level, where Prough wants the steam to condense. This is further corroborated by Fig. 1 of Prough, which shows the beams from the level sensor 26 spanning a range with its lower edge above the bottom of the temperature sensing portion 41 of the temperature probe 25 and its upper edge above the top of the temperature sensing portion 41.

6. However, that structure will only work if the steam is rising from below and cooling as it rises, as is described at col. 2, lines 54-56; col. 3, lines 43-46; col. 5, lines 45-46. See also the repeated discussion, for example, at col. 6, lines 20-26 of adjusting the steam supply to prevent "blow through" (eruption of steam through the chip surface) as the chip level varies.

7. Therefore, the steam inlet must be below five feet below the lowest surface level, that is to say, the steam inlet must be below the bottom of the temperature sensing portion 41 of the temperature probe 25.

The examiner, having paraphrased parts of the paragraphs of Prough noted above, asserts without further analysis that "it would have been obvious thus, to one skilled in the art at the time the invention was made, that the steam orifice 22 of Prough, would be above said level." The examiner is respectfully reminded that, to establish a prima facie case of obviousness, the examiner must show that the prior art reference teaches or suggests all the claim limitations, that there is some suggestion or motivation in the prior art to modify the reference, and that there is a reasonable expectation of success. In the present case the examiner has not met any of those requirements, but has merely asserted as obvious something that is clearly contrary to the teaching of Prough. In fact, there is no disclosure or suggestion in Prough of admitting steam above the level of the chips. There is no suggestion or motivation to modify Prough as the examiner has done. In fact Prough repeatedly reminds the reader that the steam should condense five feet <u>below</u> the surface level,

necessarily implying that the steam is introduced lower than that. (See also col. 6, lines 1-3, where Prough specifies a gas temperature in the vent of 30° C, which clearly precludes introducing live steam into the vented space above the chip level.) Without the benefit of hindsight based on the present invention, the examiner's proposed modification would not work.

The present applicant has designed a chip bin in which a steam input can be calculated to uniformly heat incoming wood chips from an incoming ambient temperature to + 210 °F. A calculated BTU input is required, which translates to pounds/hour of steam. The applicant has designed the steam injectors to transfer an engineered number of BTUs to each wood chip. This process is not addressed in the cited references.

Applicant's process begins with high pressure, high velocity steam impinging upon the incoming chip stream from steam nozzles above the level of chips in the bin, as recited in claims 1, 14, and 27. This action breaks the chip stream into individual chips for rapid heat transfer and consequently a rapid temperature increase. In embodiments of the invention this action is sustained throughout the chip fall by careful arrangement of orificed steam injectors, as recited in claims 2, 3, 6, 15, 16, and 19, which insure steam impinging continuously on the chips as well as a calculated BTU input to the chips with each set of steam injectors to arrive at the total BTU input required as chips descend from inlet to outlet. A steam pipe located around the inner side wall of the chip bin allows steam to contact the chips from the outer periphery of the chip mass to the center of the vessel. Breaking up the mass into individual chips enables a uniformity of chip temperature increase that cannot be achieved with Prough's system, in which steam is injected only below the level of chips in the bin. Heating all chips uniformly improves the removal of non-condensable vapor for digestion purposes, resulting in a higher quality pulp. None of the cited patents, Prough, Johanson, or Leask, approaches this design. Also, breaking the chip mass into individual units reduces the pounds/hour of steam required for heating the total pounds/hour of incoming wood chips.

Applying steam into a mass of chips resting in the lower part of the chip bin, as is disclosed by Prough, whereby the steam must gradually transfer heat through a chip mass having a very low conductivity, or the steam itself must percolate gradually through the chip

mass, is very inefficient as a heat transfer method. In Prough's system, the mass of chips is continuously flowing downward past the steam nozzles. Therefore, the mass of chips exposed to the steam nozzles are hottest adjacent to the point of steam entry, while being much cooler toward the center of the bin. Both the Prough and Johanson designs use steam nozzles which direct steam upon a chip flow that continuously moves downward and out of the bin. Prough's and Johanson's approach allows wood chip exposure to live steam only momentarily as the chips pass the steam nozzle. There is not enough dwell time to allow chips not adjacent to the nozzle to heat. The incoming steam almost immediately condenses as it impinges upon the cold chips. In fact, Prough uses this condensing factor as a basic design concept. In his patent are multiple statements concerning condensing steam input about 5 ft below the surface of the chip column. The applicant's chip bin design eliminates this severe problem with uniform wood chip heating which assures non-condensable gas elimination.

For all of the above reasons, it is believed that the present invention, as claimed in claims 1, 14, and 27, would not have been obvious to a person of ordinary skill in the art having regard to the disclosure of Prough.

Claims 2 and 15 depend from claims 1 and 14. Without prejudice to their individual merits, claims 2 and 15 are deemed allowable over the cited references for the same reasons as their respective base claims.

In addition, however, claims 2 and 15 recite upwardly-angled steam orifices arranged in the upper part of the chip bin. The examiner refers to "upwardly angled pipe 28 located in the lower part of the bin" in Prough. As previously explained, Prough's pipe 28 is not an orifice; pipe 28 is the supply to the VibraBin. In any case, both pipe 28 and the Vibra-Bin are irrelevant to claim 2, because they are undisputedly in the lower part of the bin, far below the surface level of the chips. The examiner nowhere alleges that there is any disclosure or suggestion in Prough of steam orifices arranged to direct steam upwards at the falling chips and thereby to delay the falling of the chips, as recited in claims 2 and 15. The rejection of claims 2 and 15 is traversed on the ground that no proper ground of rejection has been stated, and none is believed to exist.

Claims 3 and 16 are rejected as obvious over Prough in view of Leask. Leask is cited only as showing the additional feature of claims 3 and 16 and, without prejudice to their individual merits, these claims are deemed to be allowable over the combination of Prough and Leask for the same reasons as their respective base claims are deemed to be allowable over Prough alone.

In addition, the examiner's rejection is apparently based on the assertion that "Leask discloses a chip bin 10 into which steam is introduced tangentially from cyclone separator 44." Applicant has already responded to this rejection. Applicant's response is unrebutted and is therefore deemed to have overcome this rejection.

In support of his rejection, the examiner cites a long paragraph from Leask, the most relevant part of which reads:

> This exhaust conduit, identified as 43, connects to the tangential inlet of an exhaust cyclone separator 44. The latter includes an overflow pipe 45 for discharge of any gas or steam delivered to the separator, while the open apex of the cyclone 44 delivers from the separator any fibers ... and directs the same to the bin 10 to re-enter the system.

As pointed out in applicant's previous response, the examiner's position is factually incorrect. Leask does not show introducing steam from the cyclone separator into the bin 10. The steam goes up the overflow pipe 45, see col. 3, lines 49-50, and only the fibers fall into the bin 10. That is what the cyclone separator is for. Nothing enters Leask's bin 10 tangentially. The exhaust enters the *cyclone separator* tangentially, but the cyclone separator 44 and the bin 10 are different and not comparable. The "open apex" connecting the cyclone separator to the bin 10 is on the axis of the cyclone, and in the center of the bin. The ordinary physics of rotating systems would require anything falling through the open apex to substantially dissipate its angular motion first. The fibers fall straight down from the apex of the separator 44 through the top of the chip bin 10. There is no suggestion in either Prough or Leask that introducing steam tangentially "would improve the distribution of wood chips in the bin." That suggestion is found only in the present application, applied with the benefit of impermissible hindsight. The structure 10 of Leask is not a "chip bin," in the sense in which that term is used in the present application. The "claims 'must be read in view of the specification, of which they are a part.'" *Phillips v. AWH Corp.*, 75 USPQ2d

1321 (Fed. Cir. 2005) (*en banc*), citing *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed. Cir. 1995) (*en banc*).

The position and angle of the steam injectors are unique as compared with Prough, Johanson, and Leask. The present invention makes it possible to design each set of nozzles on each steam header for a specific mass flow rate, velocity, and angle of impact on the chips. Some orifices can be made large, to break up the falling mass of chips. Most may be designed to impart a certain amount of heat while maintaining a rotary path of the chips around the inner circumference of the chip bin, as recited in claims 3 and 16. The chips circulate within the steam-laden atmosphere, resulting in a rapid heat transfer to the wood chips, which is not possible with the devices of Prough, Johanson, and Leask. The orifices as recited in claim 2 have a third function, to impart an effect on chip dwell time from entrance into the chip bin until exit from the chip bin.

Claims 5 and 18

With respect to claims 5 and 18, the examiner asserts that an "exhaust pipe is disclosed by Prough (Fig. 1)." Prough shows only a vent 34 emerging from the top of the chip bin. Claims 5 and 18 recite "an exhaust pipe arranged to extract gases from a space under said at least one baffle." There is no suggestion in Prough or Johanson of an exhaust pipe *arranged to extract gases from a space under said at least one baffle*. The examiner has failed to make out a *prima facie* case of obviousness, and claims 5 and 18 are deemed non-obvious over Prough and Johanson.

Prough simply says there is a vent pipe from the top of the chip bin (col. 5, lines 14-16, col. 8, line 32). This approach to venting is quite different from the approach claimed in claims 5 and 18. Prough simply exhausts steam and non-condensables collected under the top of the chip bin. The exhaust pipe is also connected to the vacuum/pressure relief device, which limits chip bin pressure and vacuum. The non-condensable gas exhaust system claimed in claims 5 and 18 gathers and removes any non-condensable gases that collect at various elevations within the structure of the chip bin. This feature is related to the applicant's approach to heating the wood chips. When the falling chip mass is broken into individual chips, the individual chips tend to heat sooner and release entrained gas at various

stages as the chips fall from the inlet nozzle. By extracting the non-condensable gases as they are produced, using an exhaust pipe leading from a space under at least one baffle, the chip bin according to claims 5 and 18 makes possible a purer steam atmosphere, enhancing the heating and degasification of the chips. The applicant's system makes possible a more uniform removal of non-condensable gases and a more uniform heating of the chips than can be achieved with Prough's device.

Claims 8 and 21

With reference to claims 8 and 21, the examiner asserts that in Prough "black liquor from the digester is introduced into the bin (col. 5, lines 1-9)." The most relevant part of the cited passage actually reads:

> Note that the steam in the line 21 comes from the flash tank 16 which is provided with black liquor from the digester, and therefore the steam in line 21 typically will have TRS gases therein.

It is respectfully pointed out that there is a difference between supplying liquor and supplying steam. The rejection is traversed as based on a mistake of fact, and claims 8 and 21 are deemed non-obvious over Prough.

Claims 10-12 and 23-25

Claims 10 and 23 were rejected as obvious over Prough. Claims 10 and 23 recite a chip bin having a tapered lower part, with steam orifices positioned to direct steam downward along the surface of the tapered part within the chip bin. There is no disclosure or suggestion of any such structure in Prough. The examiner's only relevant comment appears to be that "steam is introduced into the bin through downwardly angled pipe 22 located in the upper part of the bin." The examiner nowhere alleges that Prough discloses or suggests, and Prough does not in fact disclose or suggest, steam orifices positioned to direct steam downward *along the surface of the tapered lower part within the chip bin* as required by claims 10 and 23. The purported rejection of claims 10 and 23 is traversed because no valid ground of rejection has been alleged, and none is believed to exist. There is no

disclosure or suggestion in Prough of steam orifices positioned to direct steam downward along the surface of the tapered lower part within the chip bin.

The chip bin structure recited in claim 10 is fundamentally different from that of Prough and Johanson, both of which use a Vibra-Bin for the tapered lower portion of the chip bin. The structure recited in claim 10, by directing steam downward along the surface of the tapered lower part within the chip bin, forms a vapor barrier along the surface that prevents the chips bridging at the outlet, making it possible to eliminate the Vibra-Bin. In addition, the additional steam heats the chips in the bottom of the bin and, where cooking liquor is introduced according to claims 8 and 21, insures a more uniform distribution of cooking liquor throughout the chip mass. The additional heating insures that steam condensate entrained within the chips is heated and evacuated. This action enhances the absorption of cooking liquor within the chips.

Claims 11 and 24 recite increasing the steam flow downward along the tapered bottom part of the bin in response to a "lack of normal flow" of the chips. The examiner asserts that in Prough "flow sensors and level controllers are disclosed. The controllers are interlocked with the steam application." In fact, the cited passage from Prough is concerned solely with regulating the steam supply, in dependence on the height of the mass of chips within the bin and the desired gas temperature in the vent pipe, to maintain Prough's target that the steam shall condense five feet below the chip surface, and shall neither leave the chips on the surface too cool nor blow through the surface. No reference to "flow sensors" is found. Prough's level sensor 26 cannot be used as a flow sensor, because it detects only the current chip level, and that only within the normal operating range. There is no disclosure or suggestion in Prough of a sensor arranged to increase the rate of flow of steam when the sensor indicates a lack of normal flow of chips, as recited in claims 11 and 24, and the examiner does not even allege that any such disclosure or suggestion is present.

Claims 12 and 25 recite additional nozzles that are used only in response to a lack of normal flow of chips. There is no disclosure or suggestion in Prough of such additional nozzles, and the examiner has not alleged that any such disclosure or suggestion exists. The purported rejection of claims 12 and 25 is traversed because no ground of rejection has been shown, and claims 12 and 25 are deemed patentable over the cited prior art.

Without prejudice to their individual merits, dependent claims 20 and 28 are believed to be allowable for the same reasons as their respective base claims.

Claims 4, 6 and 17, and 19 are rejected as obvious over Prough in view of Johanson. It is noted that Johanson is relied on only for the additional features shown in dependent claims 4, 6, 17, and 19. Without prejudice to their individual merits, claims 4, 6, 17, and 19 are believed to be allowable over the combination of Prough and Johanson for the same reasons as their respective base claims are believed to be allowable over Prough alone.

Conclusion:

In view of the foregoing, reconsideration of the examiner's rejections and allowance of all of claims 1-8, 10-12, 14-25, and 27-28 are earnestly solicited.

If the examiner is minded to maintain any of his rejections, then the opportunity of an interview at which the applicant, who is well qualified as a person skilled in the art, can explain to the examiner the actual structure and function of the four devices of Leask, Johanson, Prough, and the present invention is respectfully requested.

Respectfully submitted

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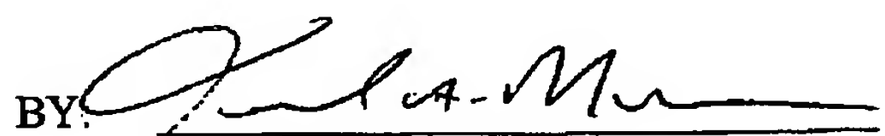
BY: 

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